

## CLAIMS

What is claimed is:

1. A method of generating an arbitrary-shaped dynamic UI (User Interface), comprising:

5 (a) loading a plurality of frames, each of the plurality of frames comprising at least one object having a non-rectangle shape when outputting to a display;

10 (b) receiving an invalidated rectangle in a specific frame among the plurality of frames, the invalidated rectangle representing a rectangular area whose contents have changes between the specific frame and its immediate previous frame;

(c) redrawing the graphic contents in the invalidated rectangle;

(d) outputting the specific frame to a display;

(e) setting the next frame of the specific frame as the specific frame; and

15 (f) repeating steps (b) to (d) to generate an arbitrary-shaped dynamic UI.

2. The method of claim 1, further comprising:

computing a boundary of the non-rectangular object.

3. The method of claim 1, further comprising:

20 establishing an invalidated rectangle list, wherein the invalidated rectangle of the specific frame is obtained from the invalidated rectangle list.

4. The method of claim 1, further comprising:

cutting the invalidated rectangle into a plurality of line segments;  
scanning each of the line segments for non-transparent pixels;  
combining the non-transparent pixels in the line segments; and  
refreshing the pixel contents of the invalidated rectangle using the combined  
5 result from the non-transparent pixels of the line segments.

5. The method of claim 1, wherein the object is a vector graphic object.

6. The method of claim 1, wherein the object is a Flash object.

7. An arbitrary-shape dynamic UI generation module, comprising:

10 a loader for loading an interactive media animation file and generates a plurality of frames according to the interactive media animation file, each of the frames having at least one non-rectangular object when being output to a display;

15 an invalidate rectangle processor for obtaining an invalidated rectangle of a specific frame from the plurality of frames, the invalidated rectangle being a rectangular area that encloses changes in content between the specific frame and its previous frame; and

a refresher, which refreshes the graphic contents inside the invalidated rectangle and outputs the specific frame to the display, thus generating a non-rectangular dynamic UI.

20 8. The module of claim 7, wherein the invalidated rectangle processor further computes a boundary of the non-rectangular object.

9. The module of claim 7, wherein the invalidated rectangle processor further performs the procedures of:

cutting the invalidated rectangle into a plurality of line segments;

scanning each of the line segments to search for non-transparent pixels therein;  
and

5 after line segment scanning, combining the non-transparent pixels in the line segments to form a result for refreshing pixel contents inside the invalidated rectangle.

10. The module of claim 7, wherein the object is a vector graphic object.

11. The module of claim 7, wherein the object is a Flash object.

12. A computer-readable storage medium recording program codes for a  
10 computer to perform the acts of:

(a) loading in a plurality of frames, each of the frames having at least one non-rectangular object when being output to a display;

(b) obtaining an invalidated rectangle of a specific frame from the plurality of frames, the invalidated rectangle being a rectangular area that encloses  
15 changes in content between the specific frame and its previous frame;

(c) refreshing graphic contents inside the invalidated rectangle;

(d) outputting the specific frame;

(e) setting the frame immediately after the specific frame as a new specific frame; and

20 (f) repeating steps B through (d) to generate a non-rectangular dynamic UI on the display.

13. The medium of claim 12, wherein the program codes further comprising program codes for the computer to perform the act of computing a boundary of the

non-rectangular object.

14. The medium of claim 12, wherein the program codes further comprising program codes for the computer to perform the act of establishing an invalidated rectangle list, the invalidated rectangle of the specific frame being obtained from the
- 5 invalidated rectangle list.

15. The medium of claim 12, wherein the program codes further comprising program codes for the computer to perform the acts of:

cutting the invalidated rectangle into a plurality of line segments;

- 10 scanning each of the line segments for searching non-transparent pixels in the line segments;

combining the non-transparent pixels in the line segments; and

using the combined result of the non-transparent pixels in the line segments to refresh pixel contents in the invalidated rectangle.

16. The medium of claim 12, wherein the object is a vector graphic object.

- 15 17. The medium of claim 12, wherein the object is a Flash object.